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The views, opinions and/or findings contained in this report are those of the author(s) and should not contrued as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT

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RPPR Final Report
as of 08-Feb-2018

Agency Code:

Proposal Number: 68879LSREP **Agreement Number: W911NF-16-1-0454**
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Report Date: 31-Oct-2017 Date Received: 08-Oct-2017
Final Report for Period Beginning 01-Aug-2016 and Ending 31-Jul-2017
Title: Enhancing Capability for Cognitive Neuroscience Research at UNLV
Begin Performance Period: 01-Aug-2016 **End Performance Period:** 31-Jul-2017
Report Term: 0-Other

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Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees: 0 **STEM Participants:** 0

Major Goals: the original purpose of the project is reprinted here:

"A new cognitive neuroscience laboratory at the University of Nevada, Las Vegas (UNLV) will be established with the help of the requested funds, which will be separate from the PI's current lab. This new lab will house equipment, computers, software, and supplies that will be purchased for transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS), electromyography (EMG), and for electroencephalography (EEG) that is compatible with this other equipment. The TMS and tDCS equipment to be purchased uses magnetic pulses and electrical current, respectively, to stimulate brain tissue for experimental purposes."

Accomplishments: Equipment, furniture, and supply purchases
In the original proposal, we planned to purchase the bulk of the equipment from Jali Medical, Inc. However, after consulting with experts in the field of TMS-compatible EEG, I decided to purchase equipment through Rogue Resolutions. They sell a TMS-compatible EEG system made by Deymed Diagnostic that is able to eliminate the electrical artifacts produced by TMS pulses within 5 milliseconds, thus allowing clean recording of brain activity shortly after TMS pulses. Deymed also manufactures TMS systems that work well with the EEG system. Despite the highly advanced technology, the prices for Deymed equipment are lower than most other manufacturers of comparable equipment. This allowed me to purchase the following pieces of equipment, furniture, and supplies for the two rooms that were provided by the Dean of Liberal Arts at UNLV:

- 2 Deymed TMS compatible EEG systems and 6 EEG caps (2 small, 2 medium, and 2 large)
- 2 Deymed TMS systems for single and double-pulse stimulation (useful for mapping motor cortex, measuring inhibition/excitation, and assessing connectivity between two brain regions)
- 2 Deymed TMS systems for repetitive stimulation (useful for virtual lesion experiments)
- 2 Deymed EMG systems (for measuring motor evoked potentials during single-pulse and double-pulse experiments)
- 2 normal size Deymed TMS coils (useful for stimulating a single brain area)
- 4 small size Deymed TMS coils (useful for placing 2 coils on head at one time for connectivity studies)
- 2 large size Deymed TMS coils (useful for stimulating deeper structures such as leg portion of motor cortex and cerebellum)
- 2 Neuroconn tDCS systems (useful for virtual lesion experiments)
- 1 Brainsight neuronavigation system (uses magnetic resonance image from individual participant or from a generic template to visualize and guide the stimulation of specific brain area)
- 2 computers for presenting auditory and visual stimuli to participants
- 2 computers for recording EEG and EMG activity

- 1 computer for analyzing data
- 2 La-Z-Boy chairs for participants to sit in during experiments
- Disposable electrodes and supplies for EEG and EMG recording

Travel and training
Originally, I proposed to travel to Boston to learn tDCS and TMS techniques in the labs of Gottfried Schlaug and Alvaro Pascual-Leone. My main contact was with Dr. Schlaug, but last fall he informed me that his lab was not fully staffed and it would therefore be difficult to host me for training sessions. As an alternative, I decided to travel to University of Southern California, where Beth Fisher's laboratory hosts an annual brain stimulation course in the summer. A student in my laboratory attended this course, which is more affordable and more science-oriented than other brain stimulation courses in Boston and South Carolina. However, Dr. Fisher informed me that they would not be offering the course in summer of 2017. I therefore plan to attend the course in summer of 2018 to take advantage of this excellent opportunity to learn brain stimulation techniques. Over the past year, I did have the opportunity to practice brain stimulation with a single-pulse Magstim system in the laboratory of Brach Poston on the UNLV campus. In July, I also traveled to the laboratory of Ramesh Balasubramaniam at UC Merced, and spent two days learning how to use his TMS systems and a neuronavigation system he has. Finally, once the equipment we purchased arrived in early August, representatives from Rogue Resolutions and Brainsight spent several days at UNLV setting up the equipment and showing us how to use some of it. Individuals from the Departments of Kinesiology and Physical Therapy also attended some of these training sessions, and plan to use the equipment in the coming years. Rogue Resolutions will be returning later this year or early next year to finish showing us how to use the tDCS system and the repetitive TMS system, which they did not have time to show us when they were here in August. Members of my lab and I continue to practice using the TMS systems, in preparation for the first experiments that we plan to perform starting next year.

Training Opportunities: Nothing to Report

Results Dissemination: Nothing to Report

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

PARTICIPANTS:

Participant Type: PD/PI
Participant: Joel Snyder
Person Months Worked: 1.00
Project Contribution:
International Collaboration:
International Travel:
National Academy Member: N
Other Collaborators:

Funding Support:

RPPR Final Report
as of 08-Feb-2018

Project title: Enhancing capability for cognitive neuroscience research at UNLV

Award number: W911NF-15-1-0454

Report due date: 10/29/17

Project site: University of Nevada Las Vegas (UNLV)

This report covers the period **August 1, 2016 through July 31, 2017**.

For reference, the original purpose of the project is reprinted here:

"A new cognitive neuroscience laboratory at the University of Nevada, Las Vegas (UNLV) will be established with the help of the requested funds, which will be separate from the PI's current lab. This new lab will house equipment, computers, software, and supplies that will be purchased for transcranial magnetic stimulation (TMS), transcranial direct current stimulation (tDCS), electromyography (EMG), and for electroencephalography (EEG) that is compatible with this other equipment. The TMS and tDCS equipment to be purchased uses magnetic pulses and electrical current, respectively, to stimulate brain tissue for experimental purposes."

Equipment, furniture, and supply purchases

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